

## 4. Infrastructure and Public Facilities

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This chapter addresses the support systems that are vital to all PUC communities. It is intended to give direction to the long-range functional and facility plans that should be prepared by each of the respective service agencies. Agencies should coordinate the planning and construction of infrastructure improvements so that: (1) services are available when needed; and (2) construction impacts to neighborhoods are minimized.

Many of the PUC's support facilities are part of islandwide or interregional systems – (e.g., water supply and wastewater management). Issues relating to sustainability of islandwide or interregional systems cannot be resolved in the context of a single regional plan like this one, but rather need to be addressed in long-range functional plans and – as need be – in the City's *General Plan*.

### 4.1 WATER ALLOCATION AND SYSTEM DEVELOPMENT

#### 4.1.1 EXISTING CONDITIONS, ISSUES AND TRENDS

The Honolulu Board of Water Supply (BWS) is responsible for the management, control and operation of Oahu's municipal water system that serves the entire Primary Urban Center Development Plan area. The BWS system is an integrated, islandwide system with interconnections between water sources and service areas. Water is exported from areas of available supply to areas of municipal demand.

The East and Central sections of the Primary Urban Center overlie the Honolulu aquifer. The western Primary Urban Center area overlies the Pearl Harbor aquifer, the largest supplier of groundwater on Oahu and the source of most of the PUC's municipal supply. Pursuant to the *State Water Code, Chapter 174C, Hawaii Revised Statutes*, the State Commission on Water Resource Management (CWRM) has determined that water resources from the Honolulu and Pearl Harbor aquifers may be threatened by existing or proposed withdrawals or diversions of water. Accordingly, the aquifers have been designated as Water Management Areas (WMAs) under the control of CWRM.

#### INTEGRATED RESOURCE PLANNING

Under the *State Water Code*, each county must prepare a long-range “water use and development plan” and submit it to the Commission on Water Resource Management for approval and inclusion as an element of the *Hawaii Water Plan*. The *Oahu Water Management Plan*, prepared by the City Department of Planning and Permitting with the assistance of the BWS, was adopted by the CWRM and the City Council in 1990. More recently, the BWS has undertaken preparation of an “integrated resource plan” that addresses all facets of water resource management, including stream flow.

The BWS will be conducting integrated resources planning by preparing individual Development Plan area watershed management plans that will identify watershed protection projects as well as inventory and develop plans for water use and development. This will meet the State Water Code requirement for preparing County Water Use and Development Plans that are consistent with County land use plans.

#### PROJECTED WATER DEMANDS FOR PUC, YEAR 2000 - 2025

Per Capita Day Demand for Years 2000 to 2025 is estimated at 173 gallons per capita per day. The per capita day demand in the PUC shows a decreasing trend from 1990 – 180 gpcd, a decrease that may be attributed to increasing density and water conservation measures. Today's best estimated current year use is the year 2000 average day demand of 78.00 million gallons per day (mgd).

Projected residential population growth from Year 2000 (419,333 persons) to year 2025 (485,849 persons) results in a 71,008-person increase of BWS served population. The resultant year 2025 water demand is expected to be 90.25 mgd, an increase of 12.25 mgd.

#### PUC DP AREA POPULATION AND WATER DEMAND

Year	Resident Population	BWS Served Population	Demand (mgd)	Per Capita Day Demand (gpcd)
2000	419,333	450,690	78.00	173
2025	485,849	521,698	90.25	173
Net Increase	66,516	71,008	12.25	

#### STRATEGIES TO MEET ADDITIONAL WATER DEMAND IN THE PUC

The BWS is planning to meet additional water demand in the PUC with the long-range integration of multiple water resource strategies consisting of:

- More efficient water system operation and reduced customer water use
- Additional groundwater development and redirecting existing sources in the Pearl Harbor basin
- Desalination of seawater
- Nonpotable water from brackish sources, recycled wastewater, existing surface reservoirs and drainage channels
- Aquifer storage and recovery
- Additional booster pumping, transmission main, and storage facilities

The BWS is planning to meet additional water demand in the Primary Urban Center by developing new sources in Waipahu and Waiawa, and constructing new trunk lines in central Honolulu. The BWS is aware of the need to integrate water resource planning for urban development, in-stream uses, agricultural uses, possible use of reclaimed water, and the sustainability of groundwater aquifers. Toward this end, the BWS is engaged in a long-range integrated water resources planning effort, in coordination with the State Commission on Water Resource Management.

#### **4.1.2 POLICIES**

- Integrate resource management of all potable and nonpotable water sources, including groundwater, stream water, storm water, and wastewater effluent.
- Adapt water conservation practices in the design of new developments and modification of existing uses, including landscaped areas.
- Implement upgrades and capacity improvements to serve projected population increases.
- Protect and maintain watersheds to ensure an adequate supply of high quality water with sufficient infiltration recharge into groundwater aquifers.

#### **4.1.3 GUIDELINES**

- Conserve the use of potable water by implementing the following measures, as feasible and appropriate:
  - Install low-flush toilets, flow restrictors rain catchment barrels, plumbing fixture meters, and other water conserving devices in commercial and residential developments.
  - Promote xeriscaping techniques to reduce water use in landscaping by using various ground cover, drought-tolerant plant material and efficient irrigation systems in landscaped areas.
  - Conduct extensive leak detection and repair for all public and private water infrastructure systems and residential, commercial and industrial plumbing. Conduct public education programs on awareness of water conservation.

- Reuse tertiary treated wastewater effluent, brackish water sources, storm runoff and surface reservoirs for the irrigation of golf courses, parks, other open landscaped areas, and industrial use.
- Develop additional potable groundwater sources in the Pearl Harbor and Honolulu Basin, redirect existing groundwater sources from Central Oahu to the Primary Urban Center, and develop a desalination plant in Honolulu to meet future demands, maintain sustainability of aquifers, and provide relief from drought periods.
- Create public watershed management partnerships to restore and manage watershed areas and conduct water conservation programs in conjunction with the BWS watershed management and water conservation programs.

Refer to the following table of potential sources to develop additional potable and nonpotable water capacity for the PUC:

POTENTIAL SOURCES OF POTABLE AND NONPOTABLE WATER FOR THE PRIMARY URBAN CENTER	
POTABLE WATER SOURCES	
Ground Water Source	Estimated Source Yield (Million Gallons per Day)
1. Waipahu Wells III	3.00
2. Waiau Wells (existing redirected source)	2.50
3. Manana Well	1.00
4. Waipahu Wells IV	3.00
5. Waialae Nui Valley Well	0.70
6. Waialae Nui Ridge Well	0.50
7. Kapakahi Well	0.60
8. Waialae West Well	0.25
9. Hoaeae Wells	2.50
10. Ewa Shaft	4.60
11. Honolulu Desalination Plant	5.00
<b>Total Additional Potable Source Capacity</b>	<b>23.65</b>
NONPOTABLE WATER SOURCES	
Nonpotable Source	Estimated Source Yield (Million Gallons per Day)
1. Recycled Wastewater	2.00
2. Nuuanu Open Reservoir Rain Catchment	1.00
3. Ala Wai Canal Stormwater	0.37
<b>Total Additional Nonpotable Source Capacity</b>	<b>3.37</b>

## **4.2 WASTEWATER SYSTEM**

### **4.2.1 EXISTING CONDITIONS, ISSUES AND TRENDS**

The City's Department of Environmental Services manages the municipal wastewater collection, treatment, and disposal system and provides almost complete service coverage for the Primary Urban Center through the Mamala Bay Sewerage District. Most of the Primary Urban Center is within the East Mamala Bay service area, with outflows processed through the Sand Island Wastewater Treatment Plant. The western portion of the Primary Urban Center, from Halawa through Pearl City, is within the West Mamala Bay service area, with outflows processed through the Honouliuli Wastewater Treatment Plant.

The East Mamala collection system, which is much older than the West Mamala system, experiences significant water infiltration. In some areas of the East Mamala subdistrict, the age of sewer lines is approaching 100 years old.

The Primary Urban Center's aging collection system is recognized as a major obstacle to the orderly development of the city. In large parts of central Honolulu, new development is restricted due to inadequate sewer capacity. Current wastewater policy requires new developments to pay for the correction of existing system deficiencies, in addition to improvements directly related to the project. In many cases, high costs for off-site wastewater facilities make development economically infeasible.

### **4.2.2 POLICIES**

- Implement wastewater collection system improvements to provide adequate service and sound facilities to existing neighborhoods and timely increases in system capacity to areas planned to undergo improvement or change in use.
- Implement adequate and timely upgrades/expansion of wastewater treatment facilities to meet the growth demands of the PUC.

### **4.2.3 GUIDELINES**

- Complete current projects needed to correct currently identified service or facility inadequacies for neighborhoods where change in service demand is not anticipated.
- In consultation with adjacent communities, implement the recommendations of the *East and West Mamala Bay Wastewater Facilities Plans* to upgrade treatment and collection systems to serve projected increases in service demands on a timely basis, as such demand increases become identified.

## **4.3 ELECTRICAL POWER**

### **4.3.1 EXISTING CONDITIONS, ISSUES AND TRENDS**

Hawaiian Electric Company (HECO) operates the electrical utility serving Oahu, subject to regulation by the State Public Utilities Commission. HECO provides electrical power through an integrated islandwide system.

While most of the electrical power generated by HECO comes from power plants in the Ewa Development Plan area, HECO maintains two power plants within the Primary Urban Center, in Waiau and central Honolulu. Power is delivered to customers by a system of transmission and distribution lines.

In 1983, HECO initiated an investigation into the reliability of its transmission and distribution systems. As a result of this investigation, as well as in response to a series of power outages and irregularities, HECO has accelerated its efforts to increase redundancy in the 138 kV transmission system on Oahu. The plan proposes a backup system consisting of several transmission line loops, connecting the various generating facilities and substations over alternative routes.

### **4.3.2 POLICIES**

- Support retention and upgrade of the Waiau and Honolulu Power Plants as part of a strategic plan to improve the reliability of the Primary Urban Center's electrical power system.
- Promote and implement energy conservation measures and integrated resource planning.
- Planning and building of new or relocated transmission lines should take into consideration system and cost concerns, and the impacts on the environment. Options to place utility lines underground should be considered, and priorities should be established.

### **4.3.3 GUIDELINES**

- In planning new or relocated substations or transmission lines, the selection of the site or route of such facilities should avoid or mitigate adverse impacts on scenic and natural resources.

## 4.4 TELECOMMUNICATIONS FACILITIES

### 4.4.1 EXISTING CONDITIONS, ISSUES AND TRENDS

Telecommunications facilities are defined as broadcasting and receiving structures associated with telecommunications services. Telecommunications facilities generally fall into three categories:

- **Broadcast:** Generally high power, with potentially hazardous exposure to radio frequency (RF) radiation, such as AM radio stations and broadcast television. These should be located away from population centers, in order to avoid radiation hazard.
- **Point-to-Point Microwave:** Generally high-power, but focused beam for line-of-sight transmissions reduces radiation hazards. These may be located in populated areas with little risk. Because they employ a highly directional beam to transmit from one point to another point, RF radiation risk in the surrounding environment is minimal. Typically, microwave antennas are placed on towers, at some distance from human activity.
- **Telecommunications:** Generally low-power antennas, serving mobile radio, cellular, personal communications service (PCS) and other “wireless” communications technologies. These are powered at 100-200 watts for intermittent use, which is far below the level of any possible health impact. (By comparison, a broadcast antenna may be powered at 50,000 watts or more).

Broadcast towers are regulated under the City’s *Land Use Ordinance* according to a national standard for radio frequency protection. This standard forces new broadcast antennas to locate in remote areas.

With the proliferation of wireless communications companies over the past several years, there is a strong demand for antenna sites both in preservation areas and in heavily built-up urban areas. A site may have multiple antennas, especially in built-up areas where coverage is more difficult to achieve. The antennas are generally small and can be camouflaged. Equipment is housed in cabinets or toolshed-like structures, which can also be camouflaged, but because the equipment requires 24-hour air conditioning, it can create noise problems when sited near residences or other uses sensitive to noise.

### 4.4.2 POLICIES

- Minimize the visual impacts and potential health hazard of new facilities.

### 4.4.3 GUIDELINES

- In general, antennas and other facilities should be required to “blend in” with the surrounding environment. Visually obtrusive installations, such as locating in the middle of an open area or silhouetting antennas on top of ridges, should be avoided.
- In granting land use permits for antennas, observe the following general principles:
  - Wherever possible, antennas should be sited on existing structures, such as tall buildings, athletic field light standards, water reservoirs, or existing towers. Antennas should be flush-mounted when possible.
  - Minimize the number of new towers (towers include lattice structures, as well as monopoles). New towers should be capable of accommodating more than one provider, with clear rules for sharing of costs.
  - Where more than one tower is required, they should be clustered rather than dispersed.

## 4.5 SOLID WASTE

### 4.5.1 EXISTING CONDITIONS, ISSUES AND TRENDS

The City’s Department of Environmental Services manages Honolulu’s municipal solid waste system, including the H-POWER resource recovery facility and one sanitary landfill. The military operates two landfills on Oahu, and a private company operates a construction debris landfill in Nanakuli. There are no sanitary landfills within the Primary Urban Center.

The 1995 *Solid Waste Integrated Management Plan* addresses the need for expanded sanitary landfill capacity. Options include expanding existing landfills and developing new landfills in both Leeward and Windward Oahu. The City is considering opening the Primary Urban Center’s first refuse convenience center at the Keehi/Middle Street Transfer Station to serve residents of the region.

### 4.5.2 POLICIES

- Reduce the solid waste stream by encouraging recycling and reuse.
- Reduce dependence on landfills by encouraging alternative waste disposal technologies.



### 4.5.3 GUIDELINES

- Promote waste recycling by expanding collection facilities and services, and public outreach and education programs.
- Expand the use of automated refuse collection in residential areas.
- Implement new technologies that more efficiently convert solid waste to green energy, thereby reducing the need for landfills.
- In planning new public facilities, include neighborhood recycling convenience centers where feasible.

## 4.6 STORMWATER SYSTEMS

### 4.6.1 EXISTING CONDITIONS, ISSUES AND TRENDS

Management of stormwater within the City and County of Honolulu is shared among Federal, State, and City agencies. City responsibilities are shared among the Departments of Planning and Permitting, Design and Construction, and Environmental Services.

Polluted stormwater runoff from agriculture, urban development, recreational boating and marinas, and wetlands activities are the leading cause of water pollution in waters across the country and in Hawaii.

The Primary Urban Center is highly urbanized and relies heavily on the attractiveness of its coastal waters and beaches for tourism, and recreational and cultural uses. Recent studies of Mamala Bay have determined that urban runoff (nonpoint sources) entering Mamala Bay from subembayments such as Pearl Harbor, Keehi Lagoon-Honolulu Harbor, Kewalo Basin, and the Ala Wai Canal is the most significant contributor to the pollution of nearshore waters. The control and management of urban watersheds and protection of its coastal water quality are the leading stormwater management issues in the Primary Urban Center.

The *mauka*, upland areas of the Primary Urban Center are drained via natural drainageways and streams that ultimately empty into Mamala Bay. In the east and central sections of the Primary Urban Center, Moanalua Stream and Kalihi Stream flow into Keehi Lagoon; Kapalama Canal and Nuuanu Stream empty into Honolulu Harbor; and the Manoa, Palolo, and Makiki Streams drain to Mamala Bay via the Ala Wai Canal. In the western section, the major drainageways are Waiawa, Waimalu, and Halawa Streams, which flow into the East Loch of Pearl Harbor. The lower reaches of most of the Primary Urban Center's major streams have been channelized to facilitate the rapid transport and disposal of runoff from urbanized areas.

The Ala Wai Canal watershed covers a significant portion of the central and eastern portion of the Primary Urban Center, including most of Waikiki. The Ala Wai Canal is a significant contributor of pollutants to the beaches and nearshore waters of Waikiki. The State Department of Health, in cooperation with City agencies, is implementing a community-based watershed management plan that included the dredging and cleanup of the canal.

#### **4.6.2 POLICIES**

- Require methods of retaining or detaining stormwater for gradual release into the ground as the preferred strategy for the management of stormwater. Where feasible, utilize open spaces including parking lots, landscaped areas, parks, and golf courses to detain or infiltrate stormwater flows to reduce their volume and runoff rates. (*City Council Resolution No. 94-296*).
- Manage stormwater flows through best management practices to minimize stormwater runoff and peak discharge rates.
- Preserve stream and estuarine habitats.

#### **4.6.3 GUIDELINES**

- Revise flood control design criteria to recognize important aesthetic and ecological factors in the design process. Streams should not be channelized except when absolutely necessary to protect existing urban development from flooding.
- Integrate planned improvements to the drainage system into the open space network by emphasizing the use of retention basins, the creation of passive recreational areas, and recreational access for pedestrians and bicycles without jeopardizing public safety. Support development of shared-use paths and parks along Manoa and Palolo Streams, Nuuanu Stream and Kapalama Canal.
- Establish best management practices to guide stormwater management within the Primary Urban Center.
- Encourage community-based watershed planning, recognizing the array of stakeholders in the Primary Urban Center's urban watersheds and the important role of education and community involvement in urban watershed management.
- Support the establishment of short- and long-term ecological monitoring programs, particularly those that measure pollutant loading and are directed at improving water quality and quantity in order to conserve, protect, and restore the natural resources of the Primary Urban Center.

- Maintain and increase permeable surfaces within public right-of-ways to facilitate bio-filtration and groundwater recharge.
- Design and construct stormwater infrastructure in areas that contribute to high inflow and infiltration into the wastewater collection system.

## **4.7 SCHOOL AND LIBRARY FACILITIES**

### **4.7.1 EXISTING CONDITIONS, ISSUES AND TRENDS**

#### **4.7.1.1 Schools**

The Primary Urban Center encompasses three public school districts – Honolulu, Leeward (portion) and Central Oahu (portion) – that consist of over 70 schools, including nine high schools (Kalani, Kaimuki, Roosevelt, McKinley, Farrington, Radford, Moanalua, Aiea, and Pearl City). The Primary Urban Center also includes a similar number of private and parochial schools.

#### **4.7.1.2 Colleges and Universities**

The Primary Urban Center hosts the State's largest concentration of public and private post-secondary institutions, including the University of Hawaii at Manoa. Other major campuses include the University of Hawaii's community colleges (Kapiolani and Honolulu), Chaminade University, Hawaii Pacific University's downtown campus and a number of smaller private colleges. The University of Hawaii also operates research and teaching facilities at Kakaako, Honolulu Harbor, Sand Island, and the Waikiki Aquarium.

#### **4.7.1.3 Libraries**

The Primary Urban Center is served by the State's Main Library located in the Capitol District, two regional libraries in Kaimuki and Pearl City, and branch libraries in Aiea, Kalihi-Palama, Liliha, Manoa, McCully-Moiliili, Salt Lake-Moanalua, and Waikiki-Kapahulu. Also located in the Primary Urban Center is the Library for the Blind and Physically Handicapped.

#### **4.7.1.4 Trends**

State and City capital improvement budgets are focused on the new growth areas in the State, including development of new facilities in Kapolei. Within the Primary Urban Center, the general strategy is to maintain existing, usually aging, educational and library facilities.

Public schools in the Primary Urban Center are some of the oldest in the State, and several, such as McKinley High School, have historic status. Some schools have experienced enrollment declines, reflecting the aging population profile of most Primary

Urban Center neighborhoods. In response, the State Department of Education (DOE) adjusts facility requirements by shifting school service boundaries and/or removing portable classrooms. If there is an increase in school-age children in the Primary Urban Center, the DOE plans to either readjust service boundaries or implement year-round, multitrack school schedules. The only new facility being considered is a new elementary school at the former Pohukaina School site to serve the expected growth in population in the Kakaako redevelopment district.

One option for schools with declining enrollments is to reuse the facilities for other community needs such as day or senior care, special needs housing, or parks. However, this alternative is sometimes complicated because, while the Department of Education owns the facilities, the land may be either ceded land, leased from the City, or be a fee-owned lot held by the State's Department of Land and Natural Resources. It is also politically unpopular to close schools.

The DOE and the City's Department of Parks and Recreation have had a joint use agreement for many years. Several elementary schools are adjacent to City parks and are used as school playgrounds, but there are sometimes conflicts over scheduling or maintenance responsibilities. The Department of Education prefers to keep secondary school facilities dedicated solely for school use to avoid scheduling problems for its athletic programs, but this would not necessarily preclude community use on weekends, holidays, semester breaks, or late evenings.

University of Hawaii's Manoa campus enrollments are projected to remain stable over the foreseeable future, with undergraduate growth projected for the planned West Oahu campus. UH's current major facility plans within the Primary Urban Center are redevelopment around Honolulu Community College, and relocation of the Pier 41 Snug Harbor research facility and Marine Mammal Laboratory at Kewalo Basin. Also under consideration for the Kakaako Makai Area are a new medical school campus and a new aquarium that would replace the Waikiki Aquarium.

#### **4.7.2 POLICIES**

- Support the development of a high quality educational system of schools and post-secondary institutions that increase the attractiveness of the Primary Urban Center as a place to live and work.
- Work with the Department of Education to develop innovative shared-use facilities, particularly on City-owned school properties.

#### **4.7.3 GUIDELINES**

- Identify ways for the City and the general community to improve conditions within and near school and college campuses. For example, the City could take a lead role in enhancing street appearance, security, and traffic and pedestrian safety near campuses.

- The City Department of Parks and Recreation should coordinate with the DOE regarding the development and use of athletic facilities such as playgrounds, playfields and courts, swimming pools, and gymnasiums, where joint use of such facilities would maximize use and reduce duplication of function without compromising the schools' athletic programs.

## **4.8 CIVIC AND PUBLIC SAFETY FACILITIES**

### **4.8.1 EXISTING CONDITIONS, ISSUES AND TRENDS**

The Primary Urban Center is served by four satellite city halls located at Ala Moana Center, Downtown, Kapalama, and Pearlridge Center. They offer many basic services, including bus pass sales, bicycle registration, and driver's license renewals. The State Department of Accounting and General Services proposes to develop a site in Liliha as a one-stop regional service center to consolidate State agencies that offer social services and business assistance, collect fees and taxes, and issue licenses and registrations.

The Honolulu Police Department serves the Primary Urban Center out of its Capitol District Headquarters and substations in Downtown-Chinatown, Waikiki, Kalihi, and Pearl City. The Honolulu Fire Department serves the Primary Urban Center from 21 fire stations. It also maintains a training facility on military land near the airport that is to be relocated once a new site is identified and secured. Ambulance service, provided by the City's Emergency Medical Services Division, is currently delivered from each of the fire stations.

In general, existing facilities are adequate to serve expected future growth in the Primary Urban Center.

### **4.8.2 POLICIES**

- Provide adequate staffing and facilities to ensure effective and efficient delivery of basic governmental service and protection of public safety.

### **4.8.3 GUIDELINES**

- As population increases, provide support for civil defense building shelters and improved technology, equipment and training for fire fighting, police protection and paramedical services.
- Establish new Satellite City Halls within neighborhood commercial complexes or community centers if there is an opportunity to do so with little or no capital expense or modest rent.